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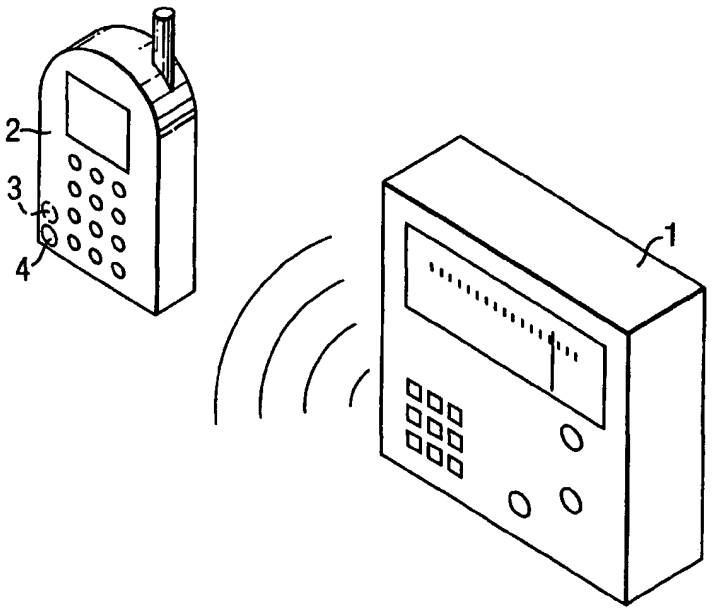
(54) Title: ASSISTED WEB-BROWSING SYSTEM



(57) Abstract: An assisted web-browsing system comprises means (1) for receiving audio material containing coded data bearing location signals capable of identifying at least one Internet-borne site carrying information relevant to said audio material and a device (5) connectable to the Internet, said device containing, or having associated therewith, processor means capable of receiving said audio material and utilizing said coded data to access said at least one site.

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ASSISTED WEB-BROWSING SYSTEM

This invention relates to systems for assisting users to locate and utilize sites on the world wide web (www). It is especially, though not exclusively useful in assisting users to access sites which are pertinent to, or have some relationship with, audio material being delivered in some way to the user. The audio material may, for example, be broadcast by way of a radio or television transmission, transmitted via a cable or other closed medium, or locally reproduced from a recording.

It is frequently the case that a user, whilst exposed to audio material, wishes to derive further information, for example about the content of the information itself, the producer, performer or composer if the material is musical in nature, or perhaps about a product referred to or advertised in the material. The ability to enable the user to satisfy that desire for further information more-or-less instantaneously would provide a powerful commercial tool for those wishing to supply the user with relevant goods or services.

The Internet provides a repository for a tremendous amount of information, via web sites and so-on, and users are becoming more and more proficient at information retrieval therefrom. However, the very scale of the information that can be accessed sometimes acts as a disincentive to the kind of reflex-action search required by a user in response to the stimulus of audio information as it is received. In particular, navigating to web-sites and navigation within extensive web-sites can be time consuming, costly and frustrating to the point that the search may be aborted. This is especially true of mobile devices, such as WAP phones, where the entry of URL numbers is cumbersome.

The invention aims to provide an assisted web-browsing system that can meet user requirements in the above respect, and which assists users to rapidly gain access to Internet-based sources of information relevant to audio material to which they are exposed.

According to the invention from one aspect there is provided an assisted web-browsing system as specified in claim 1.

According to the invention from another aspect there is provided an assisted web-browsing system as specified in claim 3.

According to a further aspect of the invention there is provided apparatus as specified in claim 17.

Preferably, the processor means is incorporated into the said device, which may comprise, for example, a mobile telephone such as a WAP phone or a wireless enabled portable digital assistant (PDA). This presents the user with an integral instrument which is easy and convenient to use.

In this case, the audio material is conveniently input via the built-in microphone of the device, and this is particularly convenient if the user is listening to the audio material through loudspeakers, although it is envisaged that cable or wireless audio feeds can be provided as an alternative to or in addition to the microphone capability.

Alternatively, the device may comprise a WAP phone or other Internet-ready instrument incorporated integrally with a radio, an MP3 player, a CD player or some other component of the audio delivery system, in which case the audio signals can (in parallel with their application to loudspeakers, earphones or headphones) be routed internally of the instrument to suitable decoding circuitry.

In another alternative preferred embodiment, the said device may comprise a separate component which may be fitted with one or more audio input facilities and an output of any convenient kind permitting communication with a mobile telephone handset.

In a further alternative preferred embodiment, the said device may be built into a component, such as a radio or an amplifier, that constitutes part or all of the audio delivery system.

In any event, it is preferred that a dedicated actuating button be provided to enable the user to activate the assisted web-browsing activity.

It is preferred that the encoding of data into the audio material is carried out in accordance with any or all of the procedures described and claimed in European Patents Nos. 0 245 037; 0 366 381 and 0 801 855; all in the name of Central Research Laboratories Limited. These procedures have been proven to be robust and effective, and the ability to render the codes inaudible has been perfected. Such procedures have been used in commerce, for example in the field of automated transmission monitoring used, particularly in North America, to detect air play in music recordings, and to ensure that advertisements and promotional speeches, such as party political speeches and the like are broadcast or transmitted at the times contracted for. The procedures are thus proven and practical.

In the present circumstances, of course, the codes carry information indicative of web-site addresses and suitable decoding apparatus is needed to decode the information and produce electrical signals that can navigate to the correct site, or sites on the Internet, but this is straightforward for those skilled in the art to implement.

In some cases the codes may be directly indicative of a site's address. Alternatively, however, the code may consist merely of a number that can be applied to a look-up table maintained, for example, on the Internet, to liberate the actual site address.

The aforementioned preferred encoding technique is based upon embedding identifying codes inaudibly within one or more notches made at one or more specific frequencies in the audio material. Typically, the codes are only inserted when the programme content of the audio material is sufficient to mask the insertion, and when programme signal breakthrough into the notch, or notches, is insufficient to interfere with reliable detection of the codes.

In such circumstances, it is preferred that the instrument or device which receives the audio material and recovers the coded data therefrom is customized so as to exhibit enhanced performance at the notch frequencies, and/or to otherwise operate upon the audio material to ensure that the coded data are recovered with sufficient reliability.

It is preferred that the instrument can access the Internet directly, via a suitable browser and connection such as GSM, 2.5G or 3G wireless. However, alternative arrangements are envisaged, whereby the decoded navigational data is stored for application (via a "docking" procedure) to a personal computer (PC) which can be used as the browsing/connection vehicle.

The invention also encompasses apparatus comprising a device containing, or having associated therewith, processor means capable of receiving audio material containing encoded data conveying information as to the address of at least one web-site, means for decoding said information and means for utilizing said decoded information to assist navigation to said at least one site.

In order that the invention may be clearly understood and readily carried into effect, one embodiment thereof will now be described, by way of example only, with reference to the accompanying drawings, of which:

Figure 1 shows, in general outline, certain elements of a system in accordance with one preferred embodiment of the invention;

Figure 2 shows, also in general outline, a system in accordance with an alternative preferred embodiment of the invention;

Figure 3 shows, in flow diagrammatic form, procedures carried out in order to operate the system of Figure 1; and

Figure 4 shows, in block diagrammatic form, a self-explanatory example of a procedure that can be used to embed coded data into audio material.

As previously indicated, there has, in recent years, been an explosion in the use of the Internet targeted at the consumer, either directly such as by e-shopping and advertising, or indirectly via product information, fan clubs, etc. and consumers are increasingly using the Internet as an information resource. The introduction of portable Internet-ready instrumentation, such as WAP phones and personal digital assistants (PDAs), Internet access is readily available on a substantially immediate basis.

From one aspect, therefore, this invention allows digital encoding technology to provide audio delivery systems with an interactive facility, whereby Internet-ready instrumentation can navigate to an appropriate web site on the basis of the delivered audio signal alone. The invention is not merely applicable to Internet-ready instrumentation, however, and in another aspect it assists navigation to or within web-sites via an instrument that is not, of itself, Internet-ready but which can be docked with, or can otherwise communicate with, a personal computer or other suitable device and thereby indirectly connected to the Internet.

Suitable procedures for incorporating digital codes into audio programme material are fully explained in the aforementioned patent applications, which are incorporated herein by reference, and will not be further addressed here, save in general outline. The procedures are generally known as "watermarking" procedures, and that terminology will be used for convenience hereinafter.

However, it is to be understood that any convenient and suitably robust coding technique may be used, and the invention is not limited in its application to the use of the specific procedures referenced in the aforementioned patent applications which are based upon embedding identifying codes inaudibly within one or more notches made at one or more specific frequencies in the audio material.

As is known from the aforementioned specifications, the codes are only inserted when the programme content of the audio material is sufficient to mask the insertion, and when programme signal breakthrough into the notch, or notches, is insufficient to interfere with reliable detection of the codes.

These known expedients serve to render the watermarking robust, and thus, of its very nature, inclined to survive various processing steps to which the audio signals may be subjected; such as replaying via loudspeakers, and sensing via the built-in microphone of a mobile telephone handset.

However, as mentioned above, it may be preferred in some circumstances to incorporate processing that can take advantage of the known characteristics of the encoding procedure to enhance the recovery of the encoded data.

Referring now to Figure 1, a radio 1 is playing audio material broadcast on a selected station. A listener (not shown) has a WAP phone 2 or other Internet-ready instrument having a microphone 3 which is exposed to the audio material.

As described above, the audio material bears encoded data that carries information that is directly or indirectly indicative of at least one address, on the world wide web, which identifies a site carrying some information relevant to the audio material being broadcast.

The WAP phone 2 is, in this embodiment, configured to decode the data and to develop the site address information into a form that it can use to directly access

the site by way of an Internet connection. This process may be performed continuously as a background task, the address information and/or the data codes being either stored temporarily in a rolling store of fixed capacity which automatically overwrites previously stored data as necessary, and used later to access the site, and/or visually displayed to the user and used for immediate access to the site.

Alternatively, the WAP phone 2 may be configured to perform the decoding function only when the listener instructs the instrument to select a particular address by pressing a selector button 4 on the instrument at the time when an item of particular interest appears in the broadcast audio material.

The embodiment of the invention described with reference to Figure 1 requires the audio material to be transduced by both the loudspeaker of the radio 1 and the microphone 3 of the WAP phone 2 and, whilst there may in such circumstances be a loss of audio quality, the robust encoding will in general survive the serial transducing operations. If necessary, however, the audio material as received by the WAP phone 2 can be enhanced as regards the encoded data by processing operations, such as digital signal recovery techniques of known kind, carried out with knowledge both of the nature of the encoding and the likely location of the encoded signals within the sound spectrum of the audio material.

Alternatively, or in addition, the audio material can be transferred from the radio 1 to the WAP phone 2 via electrical or optical cables or via an infra-red link.

If preferred, the WAP phone 2 (or other Internet-ready instrument) may be replaced by an alternative device that can be "docked" with (or otherwise communicate with) a personal computer (PC) in such a way as to download the selected address data whereby the user is automatically connected to the selected site when the PC is next connected to the Internet.

The embodiment of Figure 1 is preferred in many respects, since it provides a user-friendly, integrated system for the listener, who only has to review stored or displayed addresses or codes, or to operate the button 4, to select addresses of interest, and to decide whether to access them immediately or later. The system of Figure 1 may, in the case of some instruments, require manufacturers to make significant alterations to their mobile telephone handsets. If, however, the instrument 2 is not a mobile telephone, but a PDA with built-in wireless Internet access, the software needed to effect decoding of the coded data can be installed simply and quickly by a user.

It is further envisaged that the WAP phone 2 may have the radio 1 incorporated therein.

In an alternative preferred embodiment, shown in Figure 2, the decoding and address recognition procedures are carried out by means of an intermediate device 5 which is configured to provide selected site addresses either on a visual display 6, so that the user can input the address manually into the instrument 2 or a personal computer (PC) connected to the Internet, or via an optical or electrical cable connection or an infra-red link of any convenient kind, directly to the instrument 2 or PC.

The device 5 consists, in one preferred example, of a PDA without a wireless Internet connection; the device 5 having an infra-red link to a modem that connects to the Internet via a conventional telephone over a land-line.

As before, the device 5 may have a microphone 7 to receive the audio material output from the loudspeaker of the radio 1, or it may receive the audio material via an optical or electrical cable connection or an infra-red link of any convenient kind. Furthermore, the device 5 may be capable of performing processing operations, such as digital signal recovery techniques of known kind, on the audio material in order to enhance the reliability of the code recovery operation.

The device 5 may also have a selector button 8, corresponding to the button 4 in Figure 1, which enables a user to choose the point, or points, during the presentation of the audio material at which web-site address data are selected.

As a further alternative, the components of the intermediate device 5 may be incorporated into the radio 1, or into an amplifier or some other component of an audio reproduction system; whereby the relevant audio component can present selected web-site addresses on a visual display, and/or in optical or electronic form for transmission to a PC or to an Internet-ready instrument configured to receive the web-site data in any conveniently usable configuration. Further still, the audio component in question may have an Internet-ready configuration.

Referring now to Figure 3, this shows in flow diagrammatic form procedures utilized within the Internet-ready instrument 2 during operation of the system shown in Figure 1.

The microphone 3 feeds audio material to the normal instrument circuitry via a connection 9 and, in parallel therewith, to a code processing chain identified generally by the dashed outline 10. The processing chain 10 includes a code presence detecting stage 11 which, in preferred embodiments, provides a visual indication, for example by illumination of a light-emitting diode (LED) 12, by energizing an LED driver circuit 13 of known kind.

The received audio material passes next to a code separating stage 14, wherein encoded data is separated from the remainder of the audio material, and then to an optional code enhancing stage 15 which may be incorporated, for reasons such as those discussed above, in order to improve the reliability with which the codes can be detected and recovered.

The extracted codes are next applied to a decoding stage 16 at which the site address data are derived. At this point, in this example, the system checks

whether the selector button 4 on the instrument has been depressed by the user. If not, the address data may be dumped. Alternatively, non-selected address data may be entered into a temporary store 17, together with information as to the timing of the receipt of the relevant codes, in case the user may subsequently wish to recover them. Such temporarily stored address data may be made accessible by way of an additional directory provided in the instrument 2, or in any other convenient manner, but in any event it is envisaged that the contents of any store such as 17 would be held for only a limited time and automatically over-written by newly decoded data from subsequently received audio material.

If the selector button 4 is depressed, the selected address data are converted at stage 18 into a format recognizable by the dialing and navigational circuitry of the instrument 2, for example "provisioning" the browser of the instrument 2 with the correct URL, in order to cause the instrument 2 to directly access the web-site at the selected address. This procedure can be delayed if desired.

It will thus be appreciated that the system operates on the basis of unique web-site address identifying (ID) codes incorporated into audio material using inaudible digital watermarking technology of known kind. The audio material is reproduced for a listener who, in one embodiment, has an Internet-ready instrument, such as a WAP phone, which receives the audio material (e.g. via its microphone) and decodes the watermarked IDs, thereby providing a free-space link between the appliance, such as a radio, reproducing the audio material and the Internet-ready instrument.

The latter instrument can be configured to continuously decode the watermarked IDs, storing or using for direct Internet access only those selected by the user, or it may decode only those IDs transmitted whilst the user actuates a select button. In any event, the decoded IDs are conveniently used as part of a URL, in order to assist the browser of the instrument to navigate directly to a web-site which is in some way associated with or pertinent to the audio material from which the ID was derived. A stream of IDs may be encoded into a single

piece of audio material, whereby different forms of content can be distinguished, and the overall system effectively made interactive.

In an alternative mode of operation, the decoded data comprise merely unique sets of numbers which are of themselves not indicative of site addresses. In this case, the numbers need to be referenced to a further source of information in order to reveal the site address data, and conveniently this is achieved by way of a look-up table provided at an Internet address operated by the administrator of the system.

This arrangement is advantageous in that it accommodates changes to Internet site addresses corresponding to the data codes over their respective lifetimes, and moreover provides an access point that can be used for revenue generation by the system administrator.

In this embodiment, the decoding device, having decoded a relevant number, connects to the system administrator's Internet address which supports the look-up table for conversion from the unique identity (ID) number to the desired Internet site address. The decoding device may, at this point, be automatically connected to the latter address, or the address may be returned to the decoding device for subsequent connection thereto.

The system is effective in many application areas, such as:

(a) Music Recognition; wherein artists and bands can improve contact between themselves and their fans by having the ID of their web-site (or that of their record company or of a fan) encoded in their recordings. When such a recording is played, broadcast or otherwise transmitted, someone hearing it can use a suitable Internet-ready instrument to derive the watermarked ID from the audio material represented by the recording and thereby access directly the web-site in question which may give more information about the artist or band, the

composer of the music, the song or tune featured on the specific recording itself, discographies, tour dates and so on;

(b) Interactive Advertisements, whereby radio advertisers who wish to encourage immediate response from consumers can incorporate watermarked IDs into their advertisements, allowing consumers to link directly to a web-site at which they can find out further product information, register their interest in a product, purchase products, etc.;

(c) Interactive News, whereby news broadcasters who would like the ability to refer listeners to sources of further information as news stories unfold can encode different IDs in each news segment. Listeners can thus use their Internet-ready instruments to link directly to the correct section of an on-line news web-site, where they can follow up the story in question with in-depth information, archive material, links to related sites/stories etc.;

(d) Public Service Broadcasting, permitting public service broadcasters to closely link their broadcast programming with their information portals across all broadcasting genres. Such broadcasters tend to have vast sites which are difficult to navigate around, whereas incorporation of watermarked IDs into their broadcasts would allow each fragment of content to take the listener to the appropriate part of the broadcaster's web-site. Typical examples of areas which could benefit from the system include interviews and traffic reports;

(e) Wireless Internet Service Providers (WIPS) wishing to leverage their portals for increased e-commerce and advertising traffic. Through marketing alliances with broadcasters, such WIPS can guide customers to their web-site through interactive links in related material content, whereby a user, on hearing an item of interest, can use an Internet-ready instrument to obtain more information and/or purchase product through the WIPS portal.

In general, the decoding process may be implemented, in portable Internet-ready instruments, either at the hardware level (e.g. native ARM application) or at an operating system level (e.g. Windows CE application). When an ID is detected, the instrument converts the ID to an Internet URL or other virtual address. The conversion may be done locally at the instrument itself, or the ID can be forwarded to and Internet portal for conversion.

CLAIMS

1. An assisted web-browsing system comprising means (1) for receiving audio material containing coded data capable of identifying at least one Internet-borne site carrying information relevant to said audio material and means (2, 3) capable of recovering said coded data, characterized in that the system includes means (2) capable of utilizing the recovered data to access said at least one site.

2. An assisted web-browsing system according to claim 1 further comprising means for incorporating said coded data into recorded, broadcast or transmitted audio material.

3. An assisted web-browsing system comprising means (1) for receiving audio material containing coded data bearing location signals capable of identifying at least one Internet-borne site carrying information relevant to said audio material and a device (5) connectable to the Internet, said device containing, or having associated therewith, processor means capable of receiving said audio material and utilizing said coded data to access said at least one site.

4. An assisted web-browsing system according to claim 3 further comprising means for incorporating said coded data into recorded, broadcast or transmitted audio material.

5. An assisted web-browsing system according to claim 3 or claim 4, wherein the processor means is incorporated into the said device.

6. An assisted web-browsing system according to claim 5, wherein the device comprises a mobile telephone such as a WAP phone.

7. An assisted web-browsing system according to claim 6 wherein the audio material is input to the device via a built-in microphone thereof.

8. An assisted web-browsing system according to claim 6 or claim 7 wherein the audio material is input to the device via cable or wireless audio feeds.

9. An assisted web-browsing system according to any of claims 3, 4 or 5 wherein the said device comprises a separate component fitted with one or more audio input facilities and an output permitting communication with a mobile telephone handset or a personal computer.

10. An assisted web-browsing system according to any of claims 3, 4 or 5 wherein the said device comprises components fitted into a radio receiver or an amplifier or another audio component utilized in the presentation to a listener of said audio material and provided with an output permitting communication with a mobile telephone handset or a personal computer.

11. An assisted web-browsing system according to any of claims 3 to 10 wherein said device is provided with a dedicated actuating button to enable a user to select the assisted web-browsing activity.

12. An assisted web-browsing system according to any of claims 3 to 11 wherein said device is provided with an optical indication that said audio material contains said codes.

13. An assisted web-browsing system according to any of claims 3 to 12 wherein said device is provided with a visual display showing said at least one web-site address.

14. An assisted web-browsing system according to any preceding claim wherein the encoding of data into the audio material is based upon embedding identifying codes inaudibly within one or more notches made at one or more specific frequencies in the audio material.

15. An assisted web-browsing system according to any preceding claim wherein the codes are only inserted when the programme content of the audio material is sufficient to mask the insertion, and when programme signal breakthrough into the notch, or notches, is insufficient to interfere with reliable detection of the codes.

16. An assisted web-browsing system according to claim 14 or claim 15 wherein the device which receives the audio material and recovers the coded data therefrom incorporates means to enhance its performance at the notch frequency, or frequencies, and/or to otherwise operate upon the audio material to ensure that the coded data are recovered with sufficient reliability.

17. Apparatus comprising a device containing, or having associated therewith, processor means capable of receiving audio material containing encoded data conveying information as to the address of at least one web-site, means for decoding said information and means for utilizing said decoded information to assist navigation to said at least one site.

Fig.1.

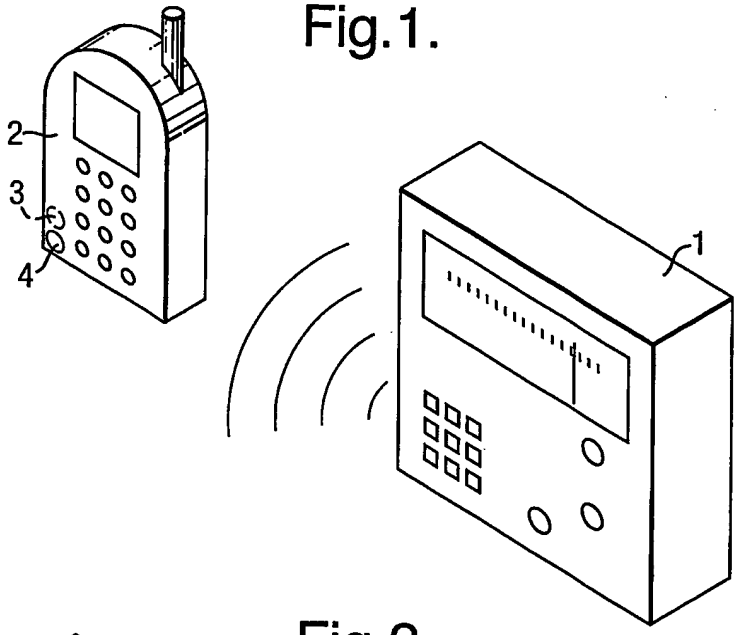


Fig.2.

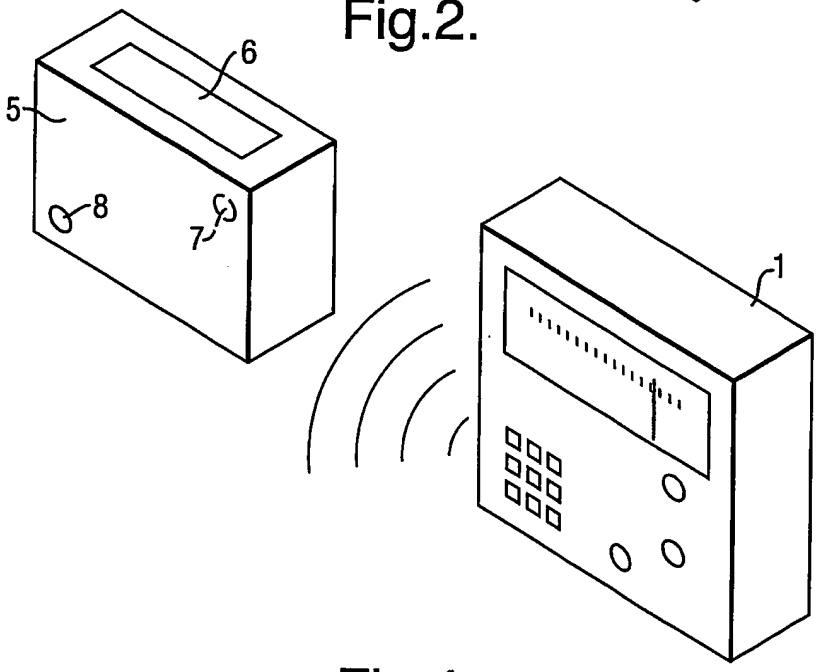


Fig.4.

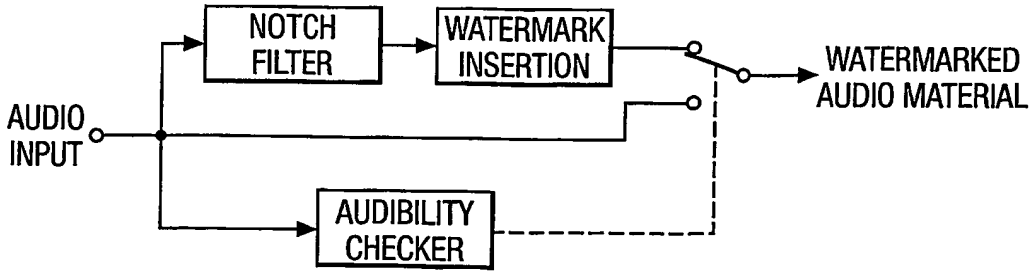
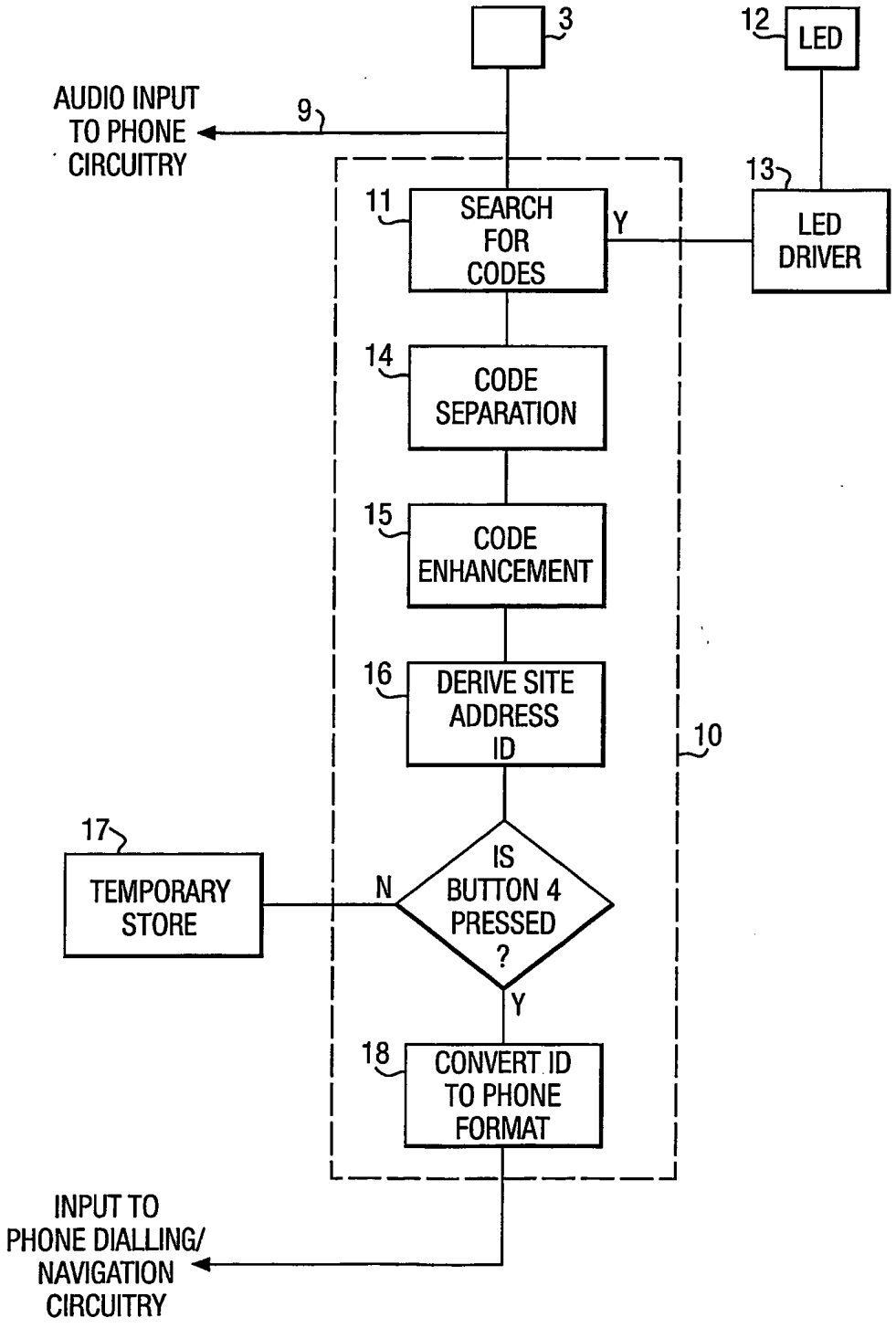


Fig.3.


3
12
LED
AUDIO INPUT TO PHONE CIRCUITRY
9
13
11
SEARCH FOR CODES
Y
LED DRIVER
14
CODE SEPARATION
15
CODE ENHANCEMENT
16
DERIVE SITE ADDRESS ID
10
17
TEMPORARY STORE
N
IS BUTTON 4 PRESSED ?
Y
18
CONVERT ID TO PHONE FORMAT
INPUT TO PHONE DIALLING/ NAVIGATION CIRCUITRY